

CHAPTER 7

TEST EQUIPMENT

YOUR RESPONSIBILITY FOR TEST EQUIPMENT

Throughout this chapter we will refer you to other publications containing information on the topic being covered. You **must read** these references to gain a basic understanding of the material and to enhance your knowledge of the subject matter.

Electronics Technicians maintain a wide variety of electronic equipments and systems in use throughout the fleet today. Therefore, ETs must be familiar with a large variety of test equipment required to properly maintain those systems. As an ET1 or ETC, you will be involved with the administration and upkeep of electronics test equipment. The condition of this test equipment will be your responsibility, either directly or indirectly.

As a senior Electronics Technician, you must be able to supervise and train maintenance personnel in the proper use of test equipment. The Electronics Material Officer (**EMO**) or in some cases the Electronics Readiness Officer (**ERO**), is responsible for all electrical and electronics Test and Monitoring Systems (**TAMS**) assigned to the command (other than avionics). Refer to NAVSEAINST 9082.1 for TAMS definitions. You will find the management of TAMS to be a considerable challenge that requires much of your attention and the attention of each individual who uses TAMS equipment. You will be responsible for assisting the EMO or ERO in the administration of a viable test equipment program. To meet these important obligations, you must have a thorough understanding of Navy test equipment programs. You must also have a working knowledge of the administrative procedures and references pertaining to test equipment.

COMMAND MANAGEMENT OF TAMS

To manage TAMS properly, a command or unit must have a knowledgeable and cohesive organization that involves all TAMS users.

The organization for managing onboard test equipment may vary from command to command; however, the line of supervision generally flows directly from the EMO or ERO to the ship's Test Equipment Petty Officer (**TEPO**) or through the division leading

CPO/PO. Figure 7-1 shows a typical test equipment chain-of-command organization.

The ship's TEPO is the focal point for all matters relating to TAMS on board the ship. All test equipment matters should be documented through one specifically designated work center, with the ship's TEPO assigned as the work center supervisor. In this way, a complete and composite status of shipboard TAMS can be obtained at anytime through just one person.

There are two categories of electronic test equipment: general-purpose electronic test equipment (**GPETE**) and special-purpose electronic test equipment (**SPETE**). GPETE is electronic test equipment that has the capability, without modification, to test two or more prime equipments or systems of basically different design. All items listed in MIL-STD-1364 are GPETE. SPETE is electronic test equipment specifically designed to test a single prime equipment or system.

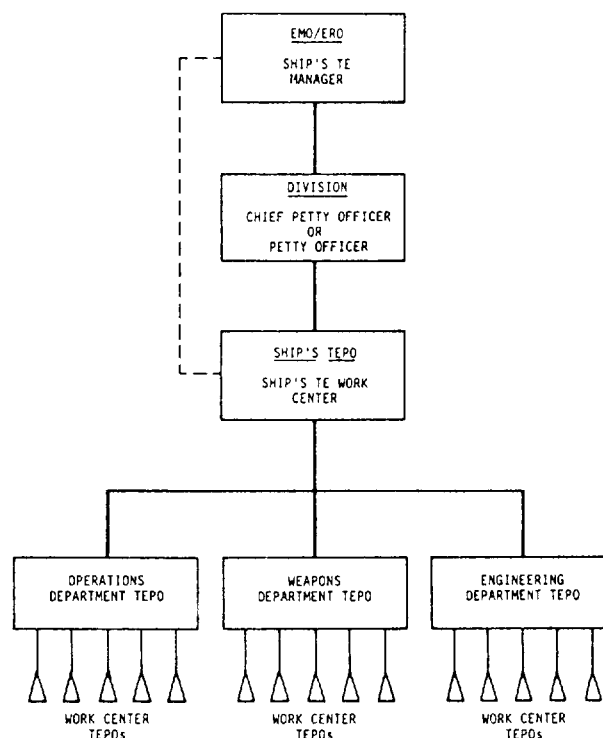


Figure 7-1. Typical shipboard test equipment organization.

TEST EQUIPMENT ADMINISTRATION

The administration of the test equipment program involves many areas; inventory, procurement, and disposal; calibration and repair; and stowage and handling. As a senior technician, you are expected to be able to manage this program. To do this properly, you must have a working knowledge of the various Navy programs that affect the administration of test equipment. In this chapter, both TAMS and test equipment will be referred to as test equipment.

The Space and Naval Warfare Systems Command, along with Naval Electronic Systems Engineering Activities and Centers, was established to replace the abolished NAVMAT and NAVELEX. However, the references you will use may still bear the names of NAVMAT and NAVELEX. Keep this change in mind as you read this chapter.

INVENTORY

The inventory of assigned test equipment is directly related to the Ship Configuration and Logistics Support Information System (SCLSIS). The allowance of test equipment for a ship is contained in the Ships Portable Electrical/Electronic Test Equipment Requirements List

(SPETERL). The SPETERL identifies the latest known requirements for Portable Electrical/Electronic Test Equipment (PEETE). New SPETERLs are forwarded to the commands before the start of any shipyard overhaul and before the start of any availability in which major electronic change-outs will occur. A sample page from a SPETERL that covers some test equipment for ET systems is shown in figure 7-2. You can compare SCLSIS documents to the SPETERL and thus identify both excesses and deficiencies. You should also compare the SPETERL and SCLSIS with the *Electrical/Electronic Test Equipment Index*, NAVSEA ST 000-AA-IDX-010/PEETE, for subcategories (SCATs) applicable to installed equipment. We will look more carefully at this index later on.

You need to keep careful inventory and distribution records of test equipment to maintain effective use, maintenance, and calibration status information. You cannot do this with just the SCLSIS and SPETERL inventory listing because test equipment distribution and user location will change between validations; test equipment is transferred between work centers; and test equipment is replaced because of failure, calibration needed, and similar reasons. To maintain a good

SHIPS PORTABLE ELECTRICAL/ELECTRONIC TEST EQUIPMENT REQUIREMENTS LIST														
S P E T E R L														
TEST EQUIPMENT QUANTITIES BASED ON WSF DATA OF 11/04/85														
USS (Ship's name) (Ship type & no.)														
SCAT FUNCTIONAL DESCRIPTION OF CODE SCAT CODE REQUIREMENT														
MFG	TEST EQUIPMENT	PRIOR	ALLOWANCE	ACC	LTD	OBS	EXC	DEF	TOTAL	P	EQUIPMENT / SYSTEM		PRIME EQUIP	
SYM	PSOM	MODEL NUMBER	ITY	LIST NO.	QTY	QTY	QTY	QTY	QTY	MOD	S	APPLICATION	PE	FOOT
													LOCATION	NOTE
													SHIPALT	
4245 MULTIMETER														
		0-4KVDC, 0-1KVAC												
CSV	55026	260-6XPL	22	7-670052807EQ						1		ASROC PCS		
CSV	55026	260-6P	23	7-670052276EQ						1		BASIC POINT DEFENSE MISSILE SYS		
CSV	55026	260-6PRT	23	7-670052596EQ						1		DEGAUSSING SYS		
		AN/PSM-4B	23	7-670050129EQ	1					9		ELECTRONICS USE-AGFF, FF		
		AN/PSM-4D	23	7-670050136EQ						1		IC SYS GEN USE-AGFF/FF/TFGL-6		
		AN/PSM-4E	23	7-670050115EQ						1		MK 16 ASROC MLS		
		AN/PSM-4F	23	7-670050122EQ						2		MK 68 GUN FIRE CONTROL SYSTEM		
		AN/USM-311	23	7-670050848EQ	5							NC-2 MOD 2/2A PLOTTER		56
		ME-48B/U	23	7-670050220EQ						1		POWER GEN USE-AGFF/FF/TFGL-6		
		ME-48D/U	23	7-670052281EQ						4		SONAR AN/SOS (-)-DEDICATED		
		ME-48E/U	23	7-670052282EQ										
		ME-48F/U	23											
CSV	55026	260-5	24	7-670051026EQ	5									
CSV	55026	260-5P	24	7-670050588EQ	1									
		AN/PSM-4C	24	7-670050143EQ										
		ME-48C	24	7-670050227EQ										
CSV	55026	260	25	7-670050150EQ										
CSV	55026	260-4	37	7-670050164EQ	2									
CSV	55026	270	37	7-670050591EQ										
CSV	55026	270-3	37	7-670052277EQ										
					14				7	21	SCAT	4245 TOTALS		
4261 FREQ, DEVIATION METER														
		100KHZ, 1,2,5 and 5 MHZ												
CODED	19397	527A	22	7-670051063EQ								AN/URQ-10	1	2-67-2-C
		AN/URM-115	23	7-670051062EQ										50
												SCAT	4261 TOTALS	

Figure 7-2.SPETERL sample page.

inventory and control of test equipment, you should follow the procedures listed below:

1. Inventory all test equipment separately on a Controlled-Equipage Custody Record, NAVSUP Form 306. Figure 7-3 shows an example of a properly

inventoried FM generator. The figure also shows a change of subcustody of this particular generator. Custody signature exchange should take place whenever the item of test equipment changes hands. The reverse side of the NAVSUP Form 306 (not shown)

S/N 0108-LF-500-6503 CONTROLLED-EQUIPAGE CUSTODY RECORD (4442) NAVSUP FORM 306 (Rev 1-83)

NSN 7Z 6625-00-389-7128		NOUN NAME CIVI 6304A		ALLOWANCE 1 (of 3)	UNIT PRICE \$ 1620	SHIP ACTIVITY (UIC CODE)	DEPT. OPS	CARD NO. 001
ALLOWANCE LIST NO. 7-670053096EQ		ADD'L DESCRIPTION GENERATOR, FM 20 MHZ - 80 MHZ				SCAT CODE: 4369		
SERIAL NO. B-678543-001		FSCM 25778 (AUL INSTRUMENTS)						
O'S REQ'N (NO.)	(QTY)	O'S REQ'N (NO.)	(QTY)	O'S REQ'N (NO.)	(QTY)	O'S REQ'N (NO.)	(QTY)	CUSTODY SIGNATURE REQUIRED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

TRANSACTION RECORD						
DATE	DOCUMENT NO.	RECEIVED FROM EXPENDED TO	QUANTITY			I ACKNOWLEDGE CUSTODY OF THIS ITEM IN THE QUANTITY SPECIFIED.
			REC'D	EXPENDED	BALANCE	
85 AUG 04	5186-4021	SUPPLY	01			ET1 Eura Wright (TEA)
85 AUG 11		OE02		01		ET2 [Signature]
85 AUG 23		OE08	01			ET1 Eura Wright (TEA)
85 AG 27		OE03		01		ET2 Johnny B. [Signature]

RECOMMENDED DATA ENTRIES

Stock Number - Enter the cognizance symbol and national stock number (NSN) indicated in the allowance list, PEETE, or latest applicable receipt invoice, whichever is more current.

Noun Name - Enter the JEIDS (Joint Electronics Type Designation System-formerly called the AN System) designator, or if there is none, use the MDS (Manufactures Designating Symbol) and model number of the particular test equipment to be recorded.

Allowance - Enter the allowance quantity as indicated in the allowance list or the allowance listed in the SPETERL.

Unit of issue and Unit Price - Enter the unit of issue and unit price indicated in the Management List-Navy (ML-N) or the latest applicable receipt document, whichever is more current.

Ship/Activity - Enter the UIC for your command.

Department - Enter the controlling department, ie. OPS.

Card No. - Number cards consecutively.

Allowance list No. - Enter the AEL (Allowance Equipage List) number from the SPETERL.

Add'l description - Enter the item description indicated in the AEL listed in the SPETERL, or the description listed in the PEETE index. This is also a convenient place to put the SCAT code (right hand side).

Serial No. - List the serial number of the test equipment being recorded. If the item does not have a serial number, then a locally devised serial number system number should be utilized for control and inventory purposes. This is also a convenient place to list the FSCM (Federal Supply Code to Manufacturer) number.

Transaction Record - All columns of this section should be used to the utmost and custody signature should be required for all the test equipment transactions.

Figure 7-3. Controlled-Equipage Custody Record, NAVSUP Form 306.

2. Prepare a second inventory, known as a test equipment status inventory, along with the NAVSUP Form 306. You can prepare this inventory on standard-ruled 5 x 8-inch index cards, as shown in figure 7-4. The example shown is a reference record of "SCAT at allowance." (SCAT codes are explained below.) All items of test equipment for a particular SCAT are listed on this card. The example shown is for SCAT code 4369. When you prepare a card, type in the SCAT code, SCAT description, allowance quantity, and headers (model, serial, subcustody, and remarks). Then use a pencil to write the information under each header, because the information is subject to change. File each card in SCAT number order under one of the following categories:

- SCAT at allowance (the example shown in figure 7-4 falls into this category, with three items allowed and three items listed.)
- Zero SCAT on board, GINO (GPETE initial outfitting) 72 Cog

- Zero SCAT on board, GEIR, (GPETE end-item replacement) 72 Cog
- Zero SCAT on board, Not 72 Cog
- Under Allowance, GINO 72 Cog
- Under Allowance, GEIR 72 Cog
- Under Allowance, Not 72 Cog

Keep this second inventory up-to-date along with the NAVSUP Form 306.

Subcategory (SCAT) Codes

SCAT codes are four-digit subcategory codes used to identify a range of measurements by functional category. Test equipment is assigned SCAT codes in the 4000 - 4999 series of numbers. SCAT codes are normally used wherever references are made to test equipment. You'll find SCAT codes in the PEETE index and in NAVAIR 16-1-525. They are also listed in the *Shore Test Equipment Index* (STEAP–Shore Test Equipment Allowance Program), which assigns shore family groups (SFGs) and provides a method of grouping shore electronic test equipment of similar measurement capabilities.

[illegible]

Figure 7-4.-Example of test equipment status inventory.

The PEETE index (fig. 7-5) is a guide that fleet personnel use to identify portable electrical/electronics test equipment required to support prime electronic, electrical, IC, weapons, and reactor instrumentation systems. This test equipment index **does not**, in anyway, supersede or modify the SPETERL, nor does it authorize procurement of, or requisition of, items listed in the SPETERL.

Figures 7-6 and 7-7 are samples of sections and appendices of the PEETE index. In the example, the GPETE information pertains to a DDG-51 class ship having an AN/PRC-10 with a SCAT code of 4369. Follow the example through each of the sections and appendices. The PEETE index will be one of your important references concerning test equipment.

Ships Portable Electrical/Electronic Test Equipment Requirements List (SPETERL)

The SPETERL is your allowance list for PEETE. The quantity of equipment for each SCAT is based upon support requirements of your ship's configuration of prime electronic, electrical, IC, weapon and reactor instrumentation equipment and systems, and depends upon factors such as the following:

- Location of prime equipments and systems
- Number of these prime equipments and systems installed
- Portability of the test equipment
- Number of personnel who use the test equipment
- Frequency of use of test equipment
- Ability to share test equipment among different divisions

Several sources of information are used to develop the SPETERL. First, cognizant naval activities provide information concerning prime equipments/systems and the PEETE required to support them. Next, NAVSEA adds this information to the database used to prepare the SPETERL. The database is then compared to the configuration of the ship as reported by SCLISIS teams and other sources. Finally, from this comparison, the SPETERL is produced, showing allowances of PEETE, quantities on hand, and similar information.

To be of use to you, the SPETERL must be valid. The most critical factor affecting the validity of SPETERL data is the accuracy and completeness of

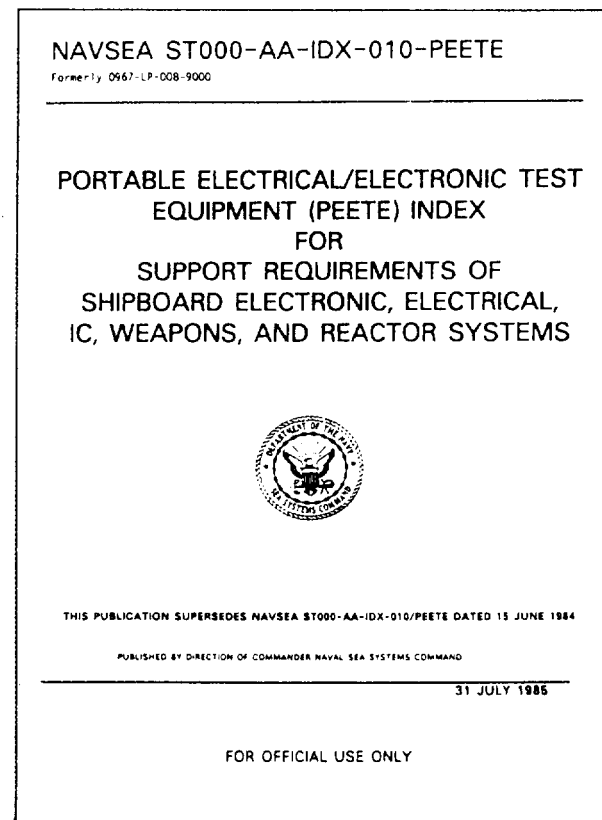


Figure 7-5.-Cover of the PEETE index.

inventory and configuration data maintained in the Weapon Systems File (WSF). This database must be continually updated to reflect configuration changes as they occur. Between validations by SCLISIS, the database is updated with changes reported by ship's force personnel on OPNAV Form 4790/CK submissions. Information on configuration changes reported by ship's force personnel to SCLISIS is provided to NAVSEA, and the SPETERL is updated to reflect current configuration and required test equipment support changes.

SCLISIS is the designated system responsible for maintaining the configuration status reported by the fleet. The SCLISIS data is maintained in a central file-the WSF at Ship's Parts Control Center (SPCC), Mechanicsburg, Pennsylvania. Supply and maintenance support managers depend on this central file for information to provide support to the fleet. Additionally, since the PEETE listed in the COSAL is based upon quantities on board, any quantity changes in PEETE must be reported in the same manner.

SECTION I

SCAT CODE REQUIREMENTS by Prime Electronic Equipment

PRIME EQUIPMENT APPLICATION
SCAT QTY P FOOT SCAT DESCRIPTION
CODE REQ M NOTE
S

AN/PRC-10

4358	1		OSCILLATOR AUDIO	20H-200K
→ 4369	1		GENERATOR FM	20M- 80M
4552	1		TUBE TESTER	ROLL CHART
4611	1		TUBE SOCKET ADAPTER	KIT

SECTION II

SCAT CODE REQUIREMENTS by Fleet Supplemental Test Equipment Requirements

FSTER EQUIPMENT/SYSTEM APPLICATION
SCAT QTY P FOOT SCAT DESCRIPTION
CODE REQ M NOTE
S

W55 APPLICATION NOTES-DDG51 CLASS

4367			GENERATOR AM/FM	10M-450M
→ 4369			GENERATOR FM	20M- 80M
4382			GENERATOR FM/AM	10M-400M

SECTION III

SCAT CODE APPLICATIONS by Scat Codes

SCAT CODE	SCAT DESCRIPTION APPLICATION-PRIME EQUIPMENT/SYSTEM	FSTER CODE
→ 4369	GENERATOR FM 20M- 80M	
	AN/PRC-10	
	AN/PRC-10A	
	AN/PRC-25	
	AN/PRC-77	
	AN/PRC-97	
	AN/VRC-46	
	GEN PURPOSE USE -NACU 2	ACU

SECTION IV

FLEET SUPPLEMENTAL TEST EQUIPMENT REQUIREMENTS by Fleet Activities

SHIP TYPE/HULL/NAME	FSTER CODES
DOG 51 ARLEIGH BURKE	X55 J5G Q5G QMD 32A CFA 99A 116 GYR VLS QPD ORT SPY HAR 15L
	→ W55 PGD PGI PG2 PG3 PG4 PG5 PG6 TMH ECS

SECTION V

TEST EQUIPMENT MODELS by Scat Codes

SCAT CODE	MODEL NUMBER	SCAT DESCRIPTION	MODEL DESCRIPTION	PRI	FSCM
→ 4369	GENERATOR FM	20M- 80M .400V-0.2V/50 OHM	20PPM FM DEV 0- 25KHZ		
	→ 6304A		GENERATOR FM 20MHZ- 80MHZ	23	25778
	TF-995A/2M		GENERATOR FM/AM 2MHZ- 220MHZ	36	09553
	8601A		GENERATOR FM/AM 0.1MHZ- 110MHZ	37	28480

SECTION VI

SCAT CODES by Test Equipment Models

MODEL NUMBER	FSCM	SCAT	MODEL DESCRIPTION AND AEL	PRI
→ 6304A	25778	4369	GENERATOR FM 20MHZ- 80MHZ	23
631B	09435	4929	CALIBRATOR AC	

Figure 7-6. PEETE Index sections.

APPENDIX A

TEST EQUIPMENT MANUFACTURERS by Manufacturers

MDS	FSCM	MANUFACTURERS NAME TO CODE NAME OF MANUFACTURER
→CDVI	25778	AUL INSTRUMENTS
	47646	AUTOMATED INDUSTRIAL ELECTRONICS
	57646	AUTOMATED INDUSTRIAL ELECTRONICS
	01014	AVTRON, NOW SYNTEL

APPENDIX B

TEST EQUIPMENT MANUFACTURERS by Federal Supply Code for Manufacturers

FEDERAL SUPPLY CODE FOR MANUFACTURERS TO NAME

MDS	FSCM	NAME OF MANUFACTURER
→CDVI	25778	AUL INSTRUMENTS
	25950	EDO COMMERCIAL, NOW REICH ASSOCIATES
CDLX	25965	ELGAR
CBGA	25995	GRAY INSTRUMENT, NOW BIDDLE
	27266	METROLOGY ENGINEERING CENTER (POMONA)
	24732	VISUAL INFORMATION INSTITUTE

APPENDIX C

FOOTNOTES NARRATIVES by Footnote Numbers

FOOTNOTES

(Specific individual footnote numbers shown below correspond to the last three digits of the SCAT code that applies for the Test Equipment Models and comments which are provided.)

.....
 . 50 - This note may be assigned to any SCAT code and indicates .
 . that the test equipment item is required at an intermediate .
 . maintenance activity (IMA) for support of the prime equipment or .
 . system to which the note is assigned. When all applications in an .
 . individual ship for a particular SCAT are assigned note 50, the .
 . required test equipment quantity will be blank (zero). In this .
 . case, the SCAT is not authorized for shipboard level maintenance. .

APPENDIX D

STOCK NUMBERS for TEST EQUIPMENT MODELS by Scat Codes

STOCK NUMBERS FOR SELECTED MODEL NUMBERS SORTED BY SCAT CODE

SCAT	COG	STOCK NUMBER	FSCM	MODEL
→4369	7Z	6625-00-389-7128	25778	6304A
4370	7Z	6625-01-018-8583	28480	8640B-001-003
4370	7Z	6625-01-018-8584	28480	8640B-001-002-003

APPENDIX E

SCAT CODE DESCRIPTIONS by Functional Description

SCAT	SCAT CODE DESCRIPTION	SCAT DESCRIPTION
→4369	GENERATOR FM	20M- 80M
4370	GENERATOR FM/AM	.5M-512M

Figure 7-7.-PEETE Index appendices.

Figure 7-8 is an example of a completed Ship's Configuration Change Form, OPNAV 4790/CK, reporting a PEETE configuration change. Refer to *Ships' 3-M Manual*, OPNAVINST 4790.4B, chapter 9, paragraph 9-9, for instructions on filing out the configuration change form.

To ensure the validity of the SPETERL and to be sure the PEETE listed in the SPETERL as being on board is COSAL-supported, compare the SPETERL against the COSAL on an annual basis. Report any discrepancies in the SPETERL to the applicable NAVSEACENDET on an OPNAV Form 4790/CK.

SHIP'S CONFIGURATION CHANGE FORM										OPNAV 4790/CK(5-84)																			
S/N 0107-LF-047-9001										CONFID FILE CORR					COMP M/A NO DEFL					COMP DEFL									
SECTION I JOB IDENTIFICATION																													
<div style="display: flex; justify-content: space-between;"> <div> JOB CONTROL NUMBER SHIP'S UIC: 00001 WORK CENTER: 0E08 JOB SEQ NR: A215 </div> <div> ALTERATION IDENTIFICATION ALTERATIONS (SHIPALT, FLD CHG, ETC): </div> </div>										SHIP'S NAME USS NEVERSAIL HULL NUMBER DD 001 EC WC 9A ACTION 5B																			
EQUIPMENT NOUN NAME AN / P S M - 4 E SP MINS EXP 0002 ACT MAINT TIME 002 COMP DATE 0058 WTR 11																													
SECTION II JOB DESCRIPTION/REMARKS																													
A D D E D M U L T I M E T E R																													
SECTION III COMPONENT CONFIGURATION CHANGE IDENTIFICATION																													
COMPONENT NOUN NAME AN / P S M - 4 E COMPONENT IDENTIFICATION NA COMPONENT APL/AEL 56731015 LOCATION (DECK/FRAME/SIDE) O P S U L EC WC 9A WTR 0C01										QUANTITY 001 CA 1																			
SECTION IV SPECIAL PURPOSE																													
26 RIN										28 ALBIN										30 BECAS OFFICE USE									
---INSTRUCTIONS---																													
ITEM NUMBER		SECTION I & II DESCRIPTION				PAGE 1		CONT PAGE		LEGEND																			
1-3		JOB CONTROL NUMBER				M		M		1A IF AVAILABLE 1P IF APPLICABLE M MANDATORY																			
4		ALTERATION IDENTIFICATION				IP		IP		20 EC WC 9A																			
5		EQUIPMENT IDENTIFICATION CODE				M		NR		SECTION III, BLOCK 6 ACTION TAKEN																			
6		ACTION TAKEN				M		NR		SECTION III, BLOCK 15 COMPONENT ACTION																			
7		EQUIPMENT NOUN NAME				M		NR		3A - PARTIALLY COMPLETED ALTERATION 3B - FULLY COMPLETED ALTERATION 3C - FULLY COMPLETED EQUIVALENT TO ALTERATION 3D - ALTERATION DIRECTION NOT APPLICABLE 1 - MAINTENANCE ACTION COMPLETED PARTS DRAWN FROM SUPPLY 2 - MAINTENANCE ACTION COMPLETED REQUIRED PARTS NOT DRAWN FROM SUPPLY (LOCAL MANUFACTURE, PRE-EXPENDED BINS) 3 - MAINTENANCE ACTION COMPLETED NO PARTS REQUIRED																			
8		SHIP'S FORCE MANHOURS EXPENDED				M		NR		MAINTENANCE ACTIONS R - REMOVED EQUIPMENT I - INSTALLED EQUIPMENT M - MODIFIED EQUIPMENT																			
9		ACTIVE MAINTENANCE TIME				M		NR		CONFID FILE CORR NO MAINTENANCE ACTION																			
10		COMPLETION DATE				M		NR		A - ADDITION OF RECORD D - DELETION OF RECORD C - CORRECT/CHANGE EXISTING RECORD																			
11		METER READING				IP		NR																					
12		JOB DESCRIPTION (REMARKS)				O		NR																					
ITEM NUMBER		SECTION III DESCRIPTION				REMOVE (R/D)		INSTALL (I/A)		MODIFY (M/C)																			
13		COMPONENT NOUN NAME				M		M		M																			
14		QUANTITY				M		M		M																			
15		COMPONENT ACTION				M		M		M																			
16		COMPONENT IDENTIFICATION				IP		IP		IP																			
17		COMPONENT SERIAL NUMBER				IA		IA		IA																			
18		COMPONENT APL/AEL				M		IA		IA																			
19		LOCATION				M		M		M																			
20		EQUIPMENT IDENTIFICATION CODE				NR		IA		NR																			
21		NEXT HIGHER ASSEMBLY				IP		IP		IP																			
22		SERVICE APPLICATION CODE				IA		IA		IA																			
23		WORK CENTER				NR		M		NR																			
24		NAMEPLATE DATA				NR		M		NR																			
25		MAINTENANCE INDEX PAGE				IA		IA		IA																			
26		EOSS				IP		IP		IP																			
27		TECH MANUAL NUMBER				IA		IA		IA																			
WORK CENTER SUPERVISOR		DIVISION OFF				SUPPLY DEPT				3 M COORDINATOR				SHIP SEQUENCE NUMBER				PAGE 1 OF 1											
WEE		CRE				JM				GCM																			

Figure 7-8. PEETE configuration change reported on a Form 479/CK.

Report discrepancies in the COSAL support to SPCC according to chapter 5 of the *COSAL use and Maintenance Manual*, SPCCINST 4441.170. Figure 7-9 is a brief SPETERL/COSAL troubleshooting guide that illustrates some of the discrepancies, their possible causes, and what action you should take.

Determining Excesses and Deficiencies

To properly determine what GPETE excesses or deficiencies exist on your ship, you should ask yourself two questions. First, “What GPETE am I allowed?” Second, “What GPETE is currently on board and physically accountable?”

Let’s look at the first question– “What GPETE am I allowed?” The **current** SPETERL and any approved Allowance Change Request (**ACR**) will indicate your ship’s allowance of GPETE. Just list the applicable SCATs with the allowed quantity as determined by the “Total Required” line. If you do not feel that the current SPETERL allowance is adequate, you may use an ACR, as specified in paragraph 3 of the “General Information” section of the SPETERL, to request that the SPETERL be modified.

Now let’s look at the second question–“What GPETE is currently on board and **physically accountable**?” In this case, “on board” means that the test equipment is actually on board or can easily be traced to a calibration and/or repair facility currently having temporary custody of the item; and “physically accountable” means that the item has been sighted during an inventory. Onboard documents that can assist you in finding those hidden items that must be sighted to give you an accurate inventory are:

- SCLISIS documents (Be sure to use the most current.)
- MEASURE Format 310 (This format will be described later.)
- Custody cards
- Test Equipment Index, Section 6 (Use this to cross model numbers to SCAT codes.)
- SPETERL (Be sure to use the most current.)

Compare all the onboard information against the actual equipment on hand and on board to determine what items are in excess and what deficiencies exist.

CONDITION/PROBLEM	POSSIBLE CAUSE	ACTION REQUIRED
PEETE required for PMS	PMS requirements not reported to NAVSEALOGSUPENGACT	Allowance Change Request (ACR)
PEETE required for PMS listed in SPETERL and on board, but not supported in COSAL	Configuration changes not reported	OPNAV 4790/CK
Quantity of PEETE on board differs from quantity on board in SPETERL	Configuration change not reported	OPNAV 4790/CK
PEETE allowed in SPETERL not on board	Deficiency in allowance	Requisition (Except GINO 7Z Cog. - GINO 7Z Cog. items cannot be requisitioned. Refer to GINO/GPETE guidelines)
PEETE on board not listed in COSAL.	Configuration change not reported	OPNAV 4790/CK
Quantity of PEETE on board differs from COSAL	Change in quantity not reported	OPNAV 4790/CK
Incorrect AEL/APL in COSAL for PEETE	Configuration change not reported	OPNAV 4790/CK

Figure 7-9.SPETERLJ/COSAL troubleshooting guide.

(Remember, this is for GPETE, not SPETE.) The result is a listing of GPETE excesses and deficiencies.

Specifying Excesses and Deficiencies

Excess means that the GPETE is not authorized in the SPETERL (or by an approved ACR) and should not be on board. TYCOMs are very explicit about what should be done with excess GPETE. GPETE in excess of the SPETERL or an approved ACR cannot be held on board and must be turned in to the NAVELEX GPETE Assets Screening Program (GASP). (Procedures are listed in the TYCOM maintenance manual.) Remember, test equipment is usually at a premium; so if an item is excess, turn it in so that another command deficient in that item can obtain it.

Now let's tackle the GPETE deficiency (shortage) problem. Deficiencies may fall into any one of the following three types:

- Deficiency caused by **new or increased allowances**– New or increased allowances of cognizance symbol 7Z GPETE equipments are not to be requisitioned by the requiring activity. These requirements will be determined, budgeted, and automatically shipped to the designated end users as equipments become available. If you have such a deficiency, you should anticipate delayed delivery on certain equipment in critically short supply.
- Deficiency caused by **missing or unserviceable equipment**– If an allowance item of GPETE is missing or unserviceable, you must prepare a Report of Survey (DD Form 200). Submit a DD Form 1348 (supply requisition) to supply for a replacement item. This requisition will then be forwarded to SPCC, Mechanicsburg, for action.
- Deficiency caused by **obsolete equipment**– If you have items designated as obsolete equipment, do not requisition replacements for them. Replacements will be handled the same way as items described earlier in "Deficiency caused by new or increased allowances."

PROCUREMENT

There are two methods for obtaining needed GPETE. The first is by either receiving or ordering the items through the supply system. The second is by requesting them through the fleet's GPETE Assets Screening Program (GASP). Both are discussed briefly below.

Issue Through Supply

You may obtain GPETE through the supply system by determining for each deficiency, by SCAT, the NSN of the GPETE. Then base your next actions on the situation listed below that pertains to your required equipment.

1. If the Cog is 7 and the item is a new requirement or an increase to allowance, it is a GPETE Initial Outfitting (GINO) item. No action is required by your ship for these GINO, 7Z cog items, as they will be pushed through the supply system to you.
2. If the Cog is 7Z and this is a replacement for another item of GPETE that is or once was on board, it is classified as GPETE End-Item Replacement (GEIR). You must requisition GIER, 7Z cog items through supply on a DD Form 1348. To replace SCAT items that are GEIR, select the preferred models of GPETE as listed in the latest *Test Equipment Index* or MIL-STD-1346.
3. If you need other odd cog items, you must requisition them. If you are replacing items previously on board, your ship's OPTAR funds will be charged. If your ship is in overhaul and

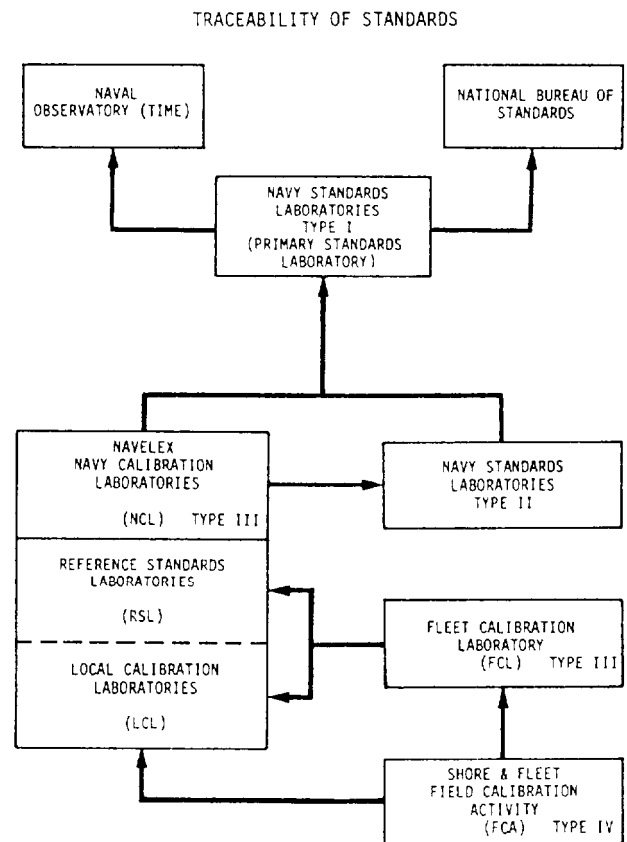


Figure 7-10.-METCAL program structure.

these other odd cog items are new requirements or an increase to allowance, NAVSEA COSAL funds will be charged. Again, you requisition these items through supply on a DD Form 1348.

GPETE Assets Screening Program (GASP)

The GASP deals with the excesses and deficiencies of the fleet. When a ship has excess GPETE, it should turn the excess into the redistribution center for possible reissue. In turn, ships that have a deficiency of GPETE should first check with GASP via the TYCOM to fill that deficiency. The redistribution center has the equipment calibrated, repaired, and made ready for issue. (Any equipment not economically repairable is turned into supply for disposition.)

CALIBRATION

Now that we have discussed how to maintain an **accurate inventory** of allowed test equipment, we will

present the somewhat complex *Test Equipment Calibration Program*. As a senior Electronics Technician, you will be required (both directly and indirectly) to ensure that the test equipment package is maintained in good working order and is properly calibrated. The Navy Metrology and Calibration (METCAL) Program was instituted to help provide calibration facilities so that sophisticated equipment, precise standards, and laboratory conditions would be available.

Calibration Activities

Various echelons of calibration activities were established to ensure that both operational and test equipments meet their calibration requirements. These echelons are integrated so that each level activity has traceable standards tied to the highest standards available for calibration. Figures 7-10 and 7-11 show the

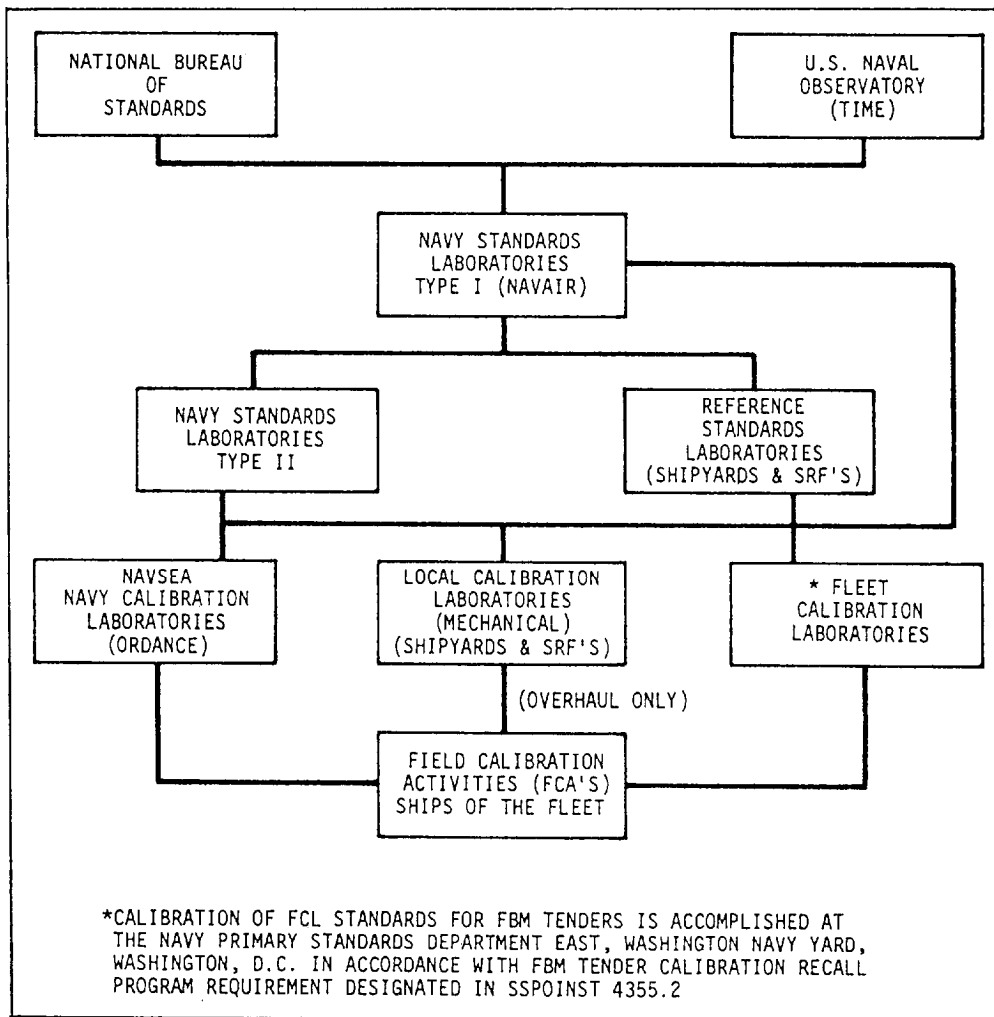


Figure 7-11. Hierarchy of calibration standards facilities.

METCAL program structure and the hierarchy of calibration standards facilities.

Refer to *Electronics Installation and Maintenance Book, Test Equipment*, NAVSEA SE000-00-EIM-040, chapter 1, for explanations of the calibration echelons shown in figures 7-10 and 7-11.

Calibration Services

Now let's take a look at an important calibration program called the *Metrology Automated System for Uniform Recall and Reporting (MEASURE)* program.

The MEASURE program is an automated data processing system designed to provide a standardized system for the recall and scheduling of test equipment into calibration facilities. It was developed to support the Department of the Navy METCAL Program in an effort to ensure that all equipment requiring calibration and servicing is submitted to a calibration activity on a timely basis and, thus, is maintained to maximum dependability. In addition, the system provides documentation of actions performed by the calibration activity.

The initial cycle of MEASURE begins with the completion of the inventory forms for equipment held by an activity. Refer to the *Metrology Automated System for Uniform Recall and Reporting (MEASURE) Users Manual*, OPNAV 43P6A, Appendix A, for completion instructions on the MEASURE TMDE inventory form. These forms are forwarded to the cognizant MEASURE data processing facility (DPF) to establish the database. The activity holding the test equipment is then provided a printed inventory and a set of preprinted Metrology Equipment Recall and Report (METER) cards. Refer to the *Metrology Automated System for Uniform Recall and Reporting (MEASURE) Users Manual*, OP 43P6A, Appendix B, for an explanation on the use and information contained on the METER card. The MEASURE cycle is completed when the cognizant METCAL representative provides recall schedules to the activity holding the test equipment and to the calibration activities. As equipment is gained or lost, more inventory forms and METER cards are processed or deleted, the database is kept current, and the system continues to cycle.

Through the submission of METER cards, each activity must promptly update its recorded inventory; that is, the inventory data maintained in the computer database by the MEASURE Operational Control Center (MOCC), and the Control Database Facility (CDBF),

Concord, California. In this way, calibration requirements can be projected in enough time to permit their incorporation into the next recall schedule. If the inventory is not updated promptly, new activity items will have to be rescheduled or be submitted to a calibration activity for unscheduled calibration by the cognizant METCAL representative.

The MEASURE program provides management personnel with a wide variety of valuable information on fleet readiness, calibration problems, budget and funding, and many other topics.

MEASURE products and formats have been designed to meet the information requirements of several levels of management. Many MEASURE formats are forwarded automatically by the MOCC or CDBF to the activities on a regular basis. Such distribution is based upon the type and level of those activities and upon established requirements. Others, however, are available only upon the receipt of an approved request from the cognizant METCAL representative. Accordingly, activities needing a particular format that they do not receive automatically should forward the requirement to the cognizant METCAL representative for approval. Any such request should include a justification of the need for the format and a statement indicating the frequency at which the format is required.

Refer to the *Metrology Automated System for Uniform Recall and Reporting (MEASURE) Users Manual*, OP 43P6A, Appendix J, for information on MEASURE formats and their distribution intervals.

Format 310 (fig. 7-1 2) is, by far, the MEASURE program's best management tool for the test equipment coordinator's use in managing the commands test equipment inventory.

To make the best use of this tool, your unit should take the following actions:

1. Have the test equipment coordinator thoroughly review the Format 310 each month.
2. Annotate the Format 310 as status changes occur for equipments that have been calibrated, deleted, are in repair, have been added to inventory, delayed, surveyed, inactivated, and so on, during the month.
3. Carry these annotations forward to the next monthly Format 310, until the change is reflected on a new Format 310.

DATE PRINTED: 051685		METROLOGY AUTOMATED SYSTEM FOR UNIFORM RECALL AND REPORTING THIS REPORT REFLECTS ALL DATA RECEIVED BY DPF AS OF 050385										PAGE NO. 1	
MEASURE FORMAT 310													
TEST EQUIPMENT INVENTORY SEQUENCED BY CUSTOMER ACTIVITY, MODEL NUMBER AND SERIAL NUMBER.													
CUSTOMER ACTIVITY (DDG37E)													
MODEL PART NO. PLANT CODE MFR SERIAL NO.	NAME PLANT ACCT NO.	PART OF	MC BY DATE	REPT DUE DATE	DATE LAST SERV	STD HRS	Q N	SCN LAB	SUB CUST	E S T TO/ICN L B ORLSTA/DATE	UNI NUMBER		
0-1107SRC16 4996UNA 13499 F35	FREQUENCY STANDARD	ANSRC23	11	072185	082184	000.0	N	NKX	DE21	1 375121	EST1976064		
0-1107SRC16 4996UNA 13499 F36	FREQUENCY STANDARD	ANSRC23	12	*041583	121582	000.0	N	NKX	DE21	1 114328	EST1976065		
0-1107SRC16 4996UNA 13499 F7	FREQ STANDARD		03	*022383	122182	000.0	N	NKX	DE21	1 Q56042	EST1068202		
0-1293210 4407 A132	GENERATOR TIME MARK		11	*022385	032384	000.0	N	NKX	DE31	1 T19781	EST4223609		
0874-9099 4604 24655 FAR11	ADAPTER COAXIAL SET		NR	N C R	000000	000.0	N	FGQ	DE31	4 FP8213	EST1976066		
0819488H12 4996UNA 20481 883	OSCILLOSCOPE	ANSRHW12	NA	N C R	020800	002.1	N	NKX	DE21	4 FP8214	EST1976067		
10100B 4598 28480 9	LOGIC PROBE	MK76	NR	N C R	031185	000.0	N	FGQ	WM22	4 209934	EST4419539		
10100B 4698 28480 WM22-002	TERMINATION COAXIAL		NR	N C R	052384	000.0	N	FGQ	WM22	4 109876	EST4284030		
10100B 4598 28480 WM22003	LOGIC PROBE		NR	N C R	000000	000.0	N	FGQ	WM22	4 FP8216	EST1976069		
10100B 4598 28480 WM22004	LOGIC PROBE		NR	N C R	000000	000.0	N	FGQ	WM22	4 FP8217	EST1976070		
1026-01 4385 58900 284807	GENERATOR SIG UWAVE		09	090685	120684	000.0	N	NKX	GASP	2 B37959	EST4276776		

Figure 7-12.-MEASURE Format 310.

- If changes in equipment status are not reflected on the new monthly Format 310 within 60 days of the transaction date, resubmit necessary MEASURE METER cards (hand scribed) to correct the discrepancy, or contact the Readiness Support Group (RSG) (Atlantic Fleet) or the Maintenance Coordinating Center (MCC) MEASURE coordinator for assistance.

Requesting Calibration

If you know and follow the detailed procedures outlined by your TYCOM, METCAL group, and area MOCC for calibration of test equipment, you will have serviced and calibrated test equipment available when you need it. You can find flow charts and area charts for calibration requests of the Atlantic and Pacific Fleets in the *Electronic Test Equipment Calibration Program Indoctrination Handbook*, NAVMAT P-9491.

The following steps for requesting calibration are general, but they should apply in most cases:

- Read and familiarize yourself with the instructions concerning test equipment

calibration procedures set forth in your TYCOM maintenance manual, and the *MEASURE Users Manual*.

- Use MEASURE products to determine the calibration due dates.
- For items scheduled for calibration or items to be calibrated, perform MIP T-1, MRC R-1.
- If an item does not checkout with T-1 and R-1, tag the equipment and note the malfunction. Either repair the inoperable equipment yourself or have your technicians repair it. Calibration activities are not required to accept equipment that is not in an operable condition. If you are unable to repair the equipment, send it to a repair facility accompanied by a job order or work request specifying exactly what is wrong.
- If your ship has a field calibration activity (FCA) on board, perform calibration on equipment within your calibration package capability. Type commanders stress that calibration must be done at the lowest level and that it be closely monitored.

6. Prepare the necessary paperwork to request repair and/or calibration. Examples of required documentation are:

a. OPNAV 4790/2K-Repair and calibration (fig. 7-13).

b. OPNAV 4790/2K-Used for requesting calibration of a large quantity of test equipment with 2L attached (fig. 7-14).
(Note: It is permissible to staple a copy of

OPNAV 4790/2K (Rev. 6-75) S/N 0107-LF-047-9011										SHIP'S MAINTENANCE ACTION FORM (2-KILO)										COMP		ONE													
SECTION I. IDENTIFICATION										JOB CONTROL NUMBER																									
1. SHIP'S UIC H 0 0 0 1										2. WORK CENTER O E 0 8										3. JOB SEC. NO. A 0 1 0		4. APL/REL 7 - 6 7 0 0 5 0 3 1 8													
A. SHIP'S NAME USS NEVERSAIL										5. EQUIPMENT HOLN NAME USN 1 1 7										6. WNO		7. STA		8. CAB		9. OPR		10. 11. 12.							
B. HULL NUMBER DD - 140										13. IDENT. EQUIPMENT SERIAL NUMBER A 2 8 1										14. ETC XX XX		15. XXXX													
15. SAFETY HAZARD <input type="checkbox"/>										16. LOCATION (Compartment/Deck/Frame/Side) X X X										17. WHEN DISCOVERED DATE X X X		18. DAY		19. X		20. X									
18. ALTERATIONS (SHIPALT, ORALT, Flt Chg, etc.)										19. INSURV NUMBER										20. INSURV USE		21. SUFFIX		22. U		23. S		24. P/F							
SECTION II. DEFERRAL ACTION										25. S/F HOURS. EXP. X X X X X										26. DEFER. DATE X X X X		27. S/F HOURS. REM. X X X X		28. DEADLINE DATE X X X X											
SECTION III. COMPLETED ACTION										29. ACT. TAN										30. S/F HOURS.		31. COMPLETION DATE YR. DAY		32. ACT. MAINT. TIME		33. YR.		34. METER READING							
SECTION IV. REMARKS/DESCRIPTION										35. REMARKS/DESCRIPTION M A I N P O W E R F U S E B L O W S U P O N T U R N I N G T H E O S C O P E P O W E R S W I T C H T O O N X X X R E Q U E S T R E P A I R A N D C A L I B R A T E (INCLUDE MODEL/PART NUMBER IN EITHER BLOCK 5 OR BLOCK 35) (NOTE: AREAS WITH "X" MUST BE FILLED IN)										36. CONT. SHEET															
37. CSMP SUMMARY O A C R E P / C A L U S M 1 1 7 O S C O P E										38. FIRST CONTACT/MAINT. MAN (Print) NAME X X X X										39. RATE NAME RATE		40. SECOND CONTACT/SUPERVISOR (Print) NAME RATE		41. PRI		42. 1/1		43. INTEGRATED PRIORITY							
C. DIV. INIT. XX										D. DEPT. INIT. XX										E. COMMANDING OFFICER'S SIGNATURE XX										F. TYCOM AUTHORIZATION		44. 100		45. TYCOM	
46. SPECIAL PURPOSE										47. BLUEPRINTS, TECH. MANUALS, PLANS, ETC. X X										48. AVAILABLE ON BOARD YES NO		49. PREARRIVAL/ARRIVAL CONFERENCE ACTION/REMARKS													
SECTION V. SUPPLEMENTARY INFORMATION										50. EST. HOURS.										51. ASST. REPAIR W/C		52. ASST. EST. HOURS.		53. SCHED. START DATE YR DAY		54. SCHED. COMP. DATE YR DAY									
55. REPAIR ACTIVITY UIC										56. WORK REQ. ROUTINE										57. EST. HOURS		58. EST. HOURS		59. EST. MATERIAL COSTS \$		60. EST. TOTAL COST \$									
61. JOB ORDER NUMBER										62. LEAD PAC CODE										63. DATE OF EST. DAY		64. FINAL ACT.		65. HOURS EXPENDED		66. DATE COMPLETED DAY									
67. COMPLETED BY (Signature - Rate)										68. ACCEPTED BY (Signature - Rate/Rank)																									

Figure 7-13.OPNAV 4790/2K for repair and calibration.

SHIP'S MAINTENANCE ACTION FORM (2-K110)									
SECTION I. IDENTIFICATION									
1. SHIP'S NAME		2. SHIP'S UIC		3. JOB NO.		4. JAG NO.		5. JAG DATE	
USS NEVERSAIL		H 0 0 0 1		O E 0 8		A 0 0 9		N A	
6. HULL NUMBER		7. EQUIPMENT SERIAL NUMBER		8. EQUIPMENT NAME		9. EQUIPMENT TYPE		10. EQUIPMENT DATE	
DO-140		VARIOUS		VARIOUS		XX XX		X XXX	
11. SAFETY		12. LOCATION (Room/Deck/Trunk/Store)		13. CONFIGURATION CHANGE		14. FOR INSURANCE USE		15. DATE	
XX		XX		XX		XX		XX	
SECTION II. DEFERRAL ACTION									
16. DEFERRAL ACTION									
SECTION III. COMPLETED ACTION									
SECTION IV. REMARKS/DESCRIPTION									
REQUEST CALIBRATION SERVICES FOR THE FOLLOWING TEST EQUIPMENT									
(ELECTRONIC)									
WC/JSN									
OE01-01000									
MJC									
N0000-0XCA-B001									
LIST									
ITEM NOMENCLATURE MODEL NR SERIAL NR SCAT									
*****OR*****									
ATTACH COPY OF MEASURE FORMAT 310, 350 or 801/802 (ANNOTATED)									
(NOTE: AREAS WITH "X" MUST BE FILLED IN)									
SECTION V. SUPPLEMENTARY INFORMATION									
17. SHIP'S NAME									
O A C C A L I B R A T I O N O F G P E T E									
18. FIRST CONTACT NAME (Last)									
NAME X X X X NAME RATE X X									
19. SPECIAL PLANS									
SECTION VI. REPAIR ACTIVITY PLANNING/ACTION									
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need to keep your systems and equipment in optimum condition.

Calibration Status Indication

The Navy calibration program has a series of distinctive labels and tags for indicating the calibration or serviceability status of all Navy test and measuring equipment. All calibration personnel and equipment users should be familiar with each label and tag and its meaning. Labels of different nomenclature, color combinations, and shapes have been designed to help users identify the calibration status. These labels and tags are used by all participants in the Navy METCAL program and must be affixed to all Navy standards and test and measuring equipment. NAVAIR 17-35MTL-1, *Metrology Requirements List (METRL)*, lists Navy calibration procedures and intervals for all standards and test and measuring equipment. Only equipment actually used for quantitative measurements requires calibration.

- ## MAINTENANCE

Test equipment requires the same two types of maintenance (preventive and corrective) you are

MAINTENANCE DOCUMENT TRANSMITTAL FORM										PAGE 1 OF 1	
FROM COMMANDING OFFICER USS <u>NEVER SAIL</u> UIC <u>00001</u>										DATE <u>6 JUN 80</u>	
TO COMMANDING OFFICER <u>RSG NORFOLK VA</u>										MOCQ	
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00001	0E01	0106X				USM 11.7	A281	7-67.00.50.318			

Figure 7-15.-Maintenance Document Transmittal Form.

familiar with in electronic equipment and systems. Preventive maintenance consists of checks to determine if the equipment is functioning properly, visual inspection for damage, lubrication, and the like. Corrective maintenance includes the isolation of trouble, the replacement of defective components, the realignment and readjustment of equipment, and such, to bring the item to a satisfactory operating level.

Preventive Maintenance

A sound preventive maintenance program for test equipment is the key to the reliable operation of test and measuring devices needed for proper preventive maintenance of our equipments and systems.

In many ships, test equipment preventive maintenance has been neglected. People often say that neither the time nor the personnel are available for an effective preventive maintenance program. However, if **preventive** maintenance is neglected, the requirement for **corrective** maintenance will grow; it may grow to the point that a critical situation may exist because test equipment needed for preventive or corrective maintenance of electronic equipments and systems is broken or improperly adjusted.

The Electronics Technician is responsible for ensuring that all test equipment is scheduled for preventive maintenance. Preventive Maintenance MIP T-1, MRC R-1 applies to ALL test equipment on board. Equipment tech manuals can be used for operational tests and test indications. Take care to ensure that all units of each equipment are checked according to the MRC. Checks in addition to those required by MIP T-1, MRC R-1 maybe annotated on the EGLs that should be completed with MRC R-1. The preventive maintenance schedules must be prepared according to the preventive maintenance instructions of each ship's type commander.

Test equipment is an important factor in the preventive and corrective maintenance of electronic and systems; therefore, a properly established (and carried out) preventive maintenance program for test equipment will yield a higher availability of operable and calibrated equipment.

Corrective Maintenance

Test equipment corrective maintenance is the correction of test equipment troubles. This includes the repair of an item after a complete breakdown, the finding of faults during preventive maintenance, or the tuning

and adjustment of an item to restore it to operating condition.

Many activities and ETs in the fleet are reluctant to repair electronics test equipment; however, the NAVY expects our ETs to perform a certain amount of maintenance and repair of their own test equipment whenever possible. The repair parts needed to make repairs may already be aboard ship. It will often be your responsibility to decide when a piece of test equipment should be repaired and who should repair it. You will need to consider the following factors.

1. Much of the test equipment now being used by naval activities is expensive and is built and calibrated to a high degree of precision. Repair often requires special laboratory facilities and skill. Although each activity should make all repairs within its capabilities, the lack of qualified personnel or adequate facilities may limit the kinds of repairs an activity should attempt. Repairs attempted by unqualified maintenance personnel or personnel working in inadequate facilities could result in extensive damage to equipment. Therefore, you should evaluate each piece of test equipment to determine if your personnel should make the repairs, especially when maintenance of test equipment requires repair of critical calibration or frequency-determining circuits. When repairs are made locally, technical manual procedures should be followed carefully; **the repair and assembly of parts must be meticulous**. When your personnel cannot make the repairs, or when the necessary post-verification is beyond the capabilities and facilities of repair personnel, forward the equipment to the nearest maintenance activity that has the proper facilities.
2. Calibration laboratories are authorized to make only incidental repairs, defined as those found necessary during calibration to bring the item within specified tolerances. Before submitting an inoperative item of test equipment for repair to a maintenance activity, you should note on an OPNAV Form 4790/2K all faults, symptoms, and other malfunction characteristics and submit the 2K through the proper channels for repair-action screening.

STOWAGE AND HANDLING

Before leaving this chapter, we need to discuss the important topic of test equipment stowage and handling. Electronic test equipments are delicate, precision, and calibrated items of equipment that are usually expensive and in high demand. Improper stowage, rough handling, heat, moisture, dust, and such, affect the availability and life of test equipment. Bumping or dropping an item may destroy the calibration of a meter, or short-circuit or break electronic elements inside the case. Bends, creases, cuts, or dents in coaxial test cables or test attenuators can alter the attenuating effect, causing false meter readings or measurements. Some items of test equipment use forced-air cooling, dust filters, and heaters. These require clean air filters for proper ventilation and a warm-up period to permit units in the test equipment to hold calibrated standards.

Board of inspection and survey (INSURV) inspections have documented time and time again that the problem of inadequate stowage facilities for portable test equipment continues to exist on ships. Degradation of equipment often results from both the unofficial rearrangement of test equipment stowage facilities by fleet personnel and inadequate provision for proper stowage facilities following ship alteration installations. As a senior technician, your job is to ensure that "your" test equipment is stowed and used properly and that your ship is not one of the ships with documented test equipment stowage problems.

Proper stowage for test equipment is detailed in the *Stowage Guide for Portable Test Equipment*, NAVSEA ST000-AB-GYD-0010/PEETE. This publication provides guidance on the use and availability of tie-down straps, shelving, shock-absorbent materials, work benches, brackets, cabinets, and other such items required for the construction of shipboard stowage facilities. In addition, the Stowage Guide's physical data and design guidance for portable electrical and electronic test equipment in use aboard ship can be helpful to ship installation and design activities as they determine adequate shipboard stowage facilities.

Take the time to read the *Stowage Guide for Portable Test Equipment* if you are not already familiar with its content. It will be of great help to you in determining how to stow your test equipment correctly.

In this chapter we have discussed the importance of test equipment to your mission and the procedures for ensuring that such equipment will be available and in

ready condition when you need to use it. Remember, your personnel are only as good as their tools. Teach them to treat test equipment carefully and with respect. This will contribute much to the success of your electronics division.

REFERENCES

- Afloat Supply Procedures*, NAVSUP Publication 485, Naval Supply Systems Command, Washington, D.C., 1991.
- Department of The Navy Metrology and Calibration (METCAL) Program*, NAVELEXINST 4355.2, Commander Naval Electronics Systems Command, Washington, D.C., 1984.
- Electrical/Electronic Test Equipment Index*, NAVSEA ST000-AA-IDX-010/PEETE, Naval Sea Systems Command, Washington, D.C., 1984.
- Electronic Test Equipment Calibration Program Indoctrination Handbook*, NAVMAT P-9491, Naval Material Command, Washington, D. C., 1979.
- Electronics Installation and Maintenance Book (EIMB), Test Equipment*, NAVSEA SE000-00-EIM-040, Naval Sea Systems Command, Washington, D.C., 1981.
- Life Cycle Management of Portable Test Equipment, Measuring and Diagnostic Equipment (TMDE)*, NAVSEAINST 9082.1, Naval Sea Systems Command, Washington, D.C., 1981.
- Metrology Requirements List (METRL)*, NAVAIR 17-35 MTL-1, Department of the Navy Metrology and Calibration Program, Naval Warfare Assessment Center, Corona, Cal., 1991.
- Metrology Automated System for Uniform Recall and Reporting (MEASURE) Users Manual*, OPNAV 43P6A, Office of the Chief of Naval Operations, Washington, D.C., 1981.
- Ships' Maintenance and Material Management (3-M) Manual*, OPNAVINST4790.4B, Office of the Chief of Naval Operations, Washington, D.C., 1990.
- Standard General-Purpose Electronic Test Equipment*, MILSTD 1364-F, Naval Electronic Systems Command, Washington, D. C., 1982.
- Stowage Guide for Portable Test Equipment*, NAVSEA ST000-AB-GYD-010/PEETE, Naval Sea Systems Command, Washington, D.C., 1982.